

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* GERALD M. BENSON  
and KENNETH L. SMITH

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Appeal 2007-2987  
Application 09/515,978  
Technology Center 1700

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Decided: November 30, 2007

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Before CHARLES F. WARREN, THOMAS A. WALTZ, and  
CATHERINE Q. TIMM, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicants appeal to the Board from the decision of the Primary Examiner finally rejecting claims 16 through 23 and 40 in the Office Action mailed April 13, 2004. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 1.191(a)(1) (2003); *see also* 37 C.F.R. § 41.31(a) (September 2004).

We affirm the decision of the Primary Examiner.

Claims 16, 20, and 40 illustrate Appellants' invention of a compound substrate, and are representative of the claims on appeal:

16. A compound substrate comprising a substantially replicated substrate having a structured surface and a discontinuous machined substrate covering only a portion of the structured surface, the compound substrate also comprising at least one geometric structure comprising a cube corner element that has at least one face disposed on the replicated substrate and at least another face disposed on the machined substrate.

20. A compound substrate comprising a substantially replicated substrate and a machined substrate, the replicated substrate having a structured surface and the machined substrate disposed in discrete pieces on the structured surface [sic] each of the replicated and machined substrates having an exposed surface that defines a face of a cube corner element on the compound substrate.

40. A compound substrate having a structured surface comprising a substantially replicated portion and a machined portion, the compound substrate further comprising at least one compound face thereon wherein the at least one compound face has a substantially planar surface having a first face portion on the machined portion of the compound substrate and a second face portion on the substantially replicated portion of the substrate, the first and second face portions being on opposite sides of a transition line.

The Examiner relies upon the evidence in these references (Answer 3):

Bacon, Jr. (Bacon)	5,614,286	Mar. 25, 1997
Nilsen	5,657,162	Aug. 12, 1997

Appellants request review of the grounds of rejection under 35 U.S.C. § 102(b) advanced on appeal: claim 40 as anticipated by Bacon; and claims 16 through 23 and 40 as anticipated by Nilsen. Br. 3; Ans. 3 and 5.

Appellants argue independent claims 16, 20, and 40 with dependent claims 17 through 19, 21, and 22 standing or falling with their respective independent claims. Br. 3. Thus, we decide this appeal based on claims 16,

20, and 40.<sup>1</sup> 37 C.F.R. § 1.192(c)(7)(2004); *see also* 37 C.F.R. § 41.37(c)(1)(vii)(September 2004).

The principal issues in this appeal are whether the Examiner has carried the burden of establishing a *prima facie* case of anticipation in each of the grounds of rejection advanced on appeal.

With respect to claim 40, the Examiner explains in graphic detail that the conformable cube corner retroreflective sheeting illustrated in Bacon's Fig. 1 is a compound substrate having a structured surface of "discrete cube corner segments (substrate and discontinuous substrate with faces)" comprising replicated and machined substrates providing a compound face with a transition line between the two face portions, wherein a face portion is provided by each of the replicated and machined portions. The Examiner finds that the structural features of the conformable cube corner retroreflective sheeting illustrated in Bacon's Fig. 1 meet the limitations of claim 40. Ans. 4 (emphasis omitted). With respect to claims 16, 20, and 40, the Examiner explains in graphic detail that the retroreflective article with multiple prisms illustrated in Nilsen's Fig. 2 is a compound substrate having a structured surface of a replicated substrate that has "a solid cube corner microprism (substrate with faces) coated with a discontinuous metallic layer

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<sup>1</sup> We do not separately consider claim 23 with respect to the second ground of rejection. With respect to this ground, Appellants state "Claims 20-23 stand or fall together" and then state that Nilsen fails to disclose a structural element "made by replication of the compound substrate of claim 20" as specified in claim 23. Br. 3 and 6. The Examiner, noting the inconsistent positions, addresses only independent claim 20, thus holding "argument regarding claim 23 . . . moot." Ans. 11. In the Reply Brief, Appellants state "[t]he grouping of claims set forth in the Appeal Brief is correct" and do not dispute the Examiner's determination that dependent claim 23 stands or falls with independent claim 20. Reply Br. 2.

(discontinuous substrate with faces . . . )” as a machined substrate, wherein a microprism comprises a cube corner element that has one face disposed on the replicated substrate and another face disposed on the machined substrate, with the respective faces of the compound face separated along a transition line. The Examiner finds that the structural features of the retroreflective article with multiple prisms illustrated in Nilsen’s Fig. 2 meet the limitations of claims 16, 20, and 40. Ans. 5-6 (emphasis omitted).

Appellants submit that the references do not anticipate the claims because neither reference discloses a “machined substrate.” Br. 5-7. Appellants contend Bacon’s sheet “is a microreplicated sheet” that has “no machined surfaces.” Br. 5, citing Bacon col. 3, l. 65 to col. 4, l. 33, col. 6, l. 64 to col. 7, l. 15, and col. 13, l. 13 to col. 14, l. 42. Appellants contend “Nilsen also fails to disclose a machined substrate.” Br. 5, citing Nilsen col. 2, ll. 35-45, and col. 3, ll. 7-19.

Appellants submit the claim terms “machined substrate” and “machined portion” impart structural limitations as the terms are used in the Specification, and thus, “it is clear that the compound substrates of claims 16-22 and 40 . . . are different from the replicated surfaces of either Nielsen or Bacon.” Br. 3-5; *see also* Br. 5-7. Appellants contend the term “[m]achined” is used to describe a surface that results when material has been physically removed from a blank to form the desired substrate or surface,” pointing out that a number of different machining processes using different material removal means are disclosed in the Specification. Br. 4, citing Spec. 9:1-12 and 9:26 to 10:5. Appellants contend that different material removal means impart different surface features to the substrate which “makes it impossible to generically define the surfaces in purely

structural terms.” Br. 4. Appellants contend “the structure implied by a seeming process term should be considered in assessing patentability where the product can only be defined by the process steps by which it is made or where the process steps would be expected to impart distinctive structural characteristics to the final product,” citing process terms such as, among other things, “welded” and “press fitted.” Br. 4.

Appellants submit “that a machined substrate and a replicated substrate are structurally different from one another.” Br. 4. Appellants contend “a machined substrate has surface features that result when the material is removed from the blank” and “the surface of a machined substrate has a crystal structure that is the same as the balance of the substrate.” Br. 4. Appellant contends “[a] replicated substrate . . . is a negative reproduction of a pre-existing surface” and “has a different crystal structure than that of the balance of the substrate.” Br. 5.

Appellants further contend with respect to claim 40, that “a transition line . . . separates the machined portion from the replicated portion of the substrate.” Br. 7. In this respect, Appellants contend Bacon’s “reference numeral 50 represents the side walls of discrete replicated cube corner segments” and “[s]ince there are no machined substrates or portions in Bacon, Bacon cannot have a transition line.” Br. 7. Similarly, Appellants contend “the joinder of metallic deposit 30A to the prism 50” in Nilsen’s Fig. 2 “does not provide a transition line that separates the machined and replicated features.” Br. 7.

The Examiner responds that in view of the claim terms “machined substrate” and “machined portion,” claims 16, 20, and 40 are drawn in product in product-by-process format, and in this respect, are given their

broadest reasonable interpretation in light of the Specification. Ans. 7. The Examiner contends these terms have not been defined by Appellants in the Specification and thus, “have been given their broadest reasonable interpretation of a substrate or portion made by a machine.” Ans. 7 and 8. The Examiner contends the passages of the Specification relied on by Appellants to provide a definition of “machined substrate/portion” instead “discuss several different processes that end in the same ‘machined substrate/portion’ which results in a discontinuous cube corner structure.” Ans. 8-9. The Examiner determines claims 16, 20, and 40 do not contain specific limitations on the method of making a “machined substrate” or “machined portion.” Ans. 8.

The Examiner contends Appellants’ arguments with respect to the structural differences between a machined substrate and a replicated substrate do not point out how the respective substrates differ, stating only “that the machined and replicated substrates are made by a different process.” Ans. 9. The Examiner contends that a reasonable interpretation “of the claimed invention in light of the specification is a compound substrate comprising a continuous substrate, i.e., the replicated substrate, with a structured surface and a discontinuous substrate, i.e., the machined substrate, covering a portion . . . [of] the structured surface of the continuous substrate,” wherein “[t]he compound substrate further comprising at . . . [least one] corner element that has at least one face disposed on the continuous substrate and another face disposed on the machined substrate.” Ans. 9-10.

The Examiner contends Bacon’s cube corner retroreflective sheeting is made with a mold and thus, by a machine, providing “a machined

substrate/portion.” Ans. 7 and 10, citing Bacon col. 3, l. 65 to col. 4, l. 19. The Examiner contends Nilsen’s metallic layer is vacuum deposited or otherwise treated to selectively form transparent reflective metallic deposits on the surface of some of the microprisms, thus forming a metallic “machined substrate” on the microprism “replicated substrate.” Ans. 7 and 10, citing Nilsen col. 2, ll. 45-49.

The Examiner contends the claim term “transition line” as defined in the Specification “as a line or other elongated feature that separates constituent faces of a compound face,” and thus “is a line between the machined substrate face and the replicated substrate face,” which is found in the relied upon illustrated embodiments of Bacon and Nilsen. Ans. 12, citing Spec. 26:13-18 and 28:25-26.

Appellants reply that the claims cannot be anticipated by Bacon and by Nilsen because the references do not describe the presence of both a machined substrate/portion and a replicated substrate/portion. Reply Br. 3 and 4. In this respect, Appellants contend Bacon creates a structured surface by molding, which is a replication process, and the segments of the structured surface are subsequently created from that molded surface, with the result that “adjacent segments cannot be different from one another,” i.e., “one cannot be machined and other replicated.” Reply Br. 3. Appellants contend that thus, Bacon’s structured surface is “either all machined or all replicated,” and points out that the Examiner’s position is that the structured surface is created by a “machine.” Reply Br. 3. Appellants further contend Nilsen’s vapor deposited metallic layer on portions of the structured surface replicates that surface, and is not machined. Reply Br. 3-4.

The issues framed by the Examiner and Appellants entail the interpretation of independent claims 16, 20, and 40 by giving the terms thereof the broadest reasonable interpretation in their ordinary usage in context as they would be understood by one of ordinary skill in the art, in light of the written description in the Specification unless another meaning is intended by Appellants as established therein, and without reading into the claim any disclosed limitation or particular embodiment. *See, e.g., In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004); *In re Hyatt*, 211 F.3d 1367, 1372 (Fed. Cir. 2000); *In re Morris*, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997); *In re Zletz*, 893 F.2d 319, 321-22 (Fed. Cir. 1989).

Each of claims 16 and 20 specify any manner of “compound substrate” comprising at least any substantially *replicated substrate* having any manner of “structured surface” having a “cube corner element,” and any manner of *machined substrate* that discontinuously covers only any portion of the “structured surface” of the *replicated substrate*, including discrete pieces of a *machined substrate* on the “structured surface” of the substantially *replicated surface*. In claim 16, the “compound substrate” further comprises at least any manner of a “geometric structure” comprising at least a “cube corner element” having one “face” disposed on the *replicated substrate* and another “face” deposited by the *machined substrate*. In claim 20, an exposed surface of each of the *replicated substrate* and the *machined substrate* defines a “face” of a “cube corner element” on the “compound substrate.”

Claim 40 specifies any manner of “compound substrate” having any “structured surface” comprising at least any substantially *replicated portion*, any manner of *machined portion*, and any manner of at least one “compound



face” having a substantially planar surface. The “compound face” has a first “face portion” on the *machined portion* and a second “face portion” on the substantially *replicated portion*, and the first and second “face portions” are on opposite sides of a *transition line*.

In the Specification, the term “compound substrate” is defined as “a substrate formed from a machined substrate having a structured surface and a replicated substrate (collectively referred to as ‘layers’) bonded along at least a portion of the interface with the machined substrate” and “[o]ne or more of the layers of the compound substrate may be discontinuous.” Spec. 26:19-22. The term “structured surface” is defined as “a surface that has a plurality of distinct faces arranged at various orientations.” Spec. 28:19-20. The term “cube corner element” is defined as “a set of three faces that cooperate to retroreflect light or to otherwise direct light to a desired location,” wherein “[s]ome or all of the faces can be compound faces;” and as “a set of three faces that itself does not retroreflect light or otherwise direct light to a desired location, but that is copied (in either a positive or negative sense ) in a suitable substrate forms a set of three faces that does retroreflect light or otherwise direct light to a desired location.” Spec. 26:25-27; *see also* 1:19-22; *cf.* 28:1-8 and 3:23 to 4:5. The term “compound face” is defined as “a face composed of at least two distinguishable faces (referred to as ‘constituent faces’) that are approximate each other” and “substantially aligned with one another.” Spec. 26:13-15. The term “face” is defined as “a substantially smooth surface.” Spec. 27:16. The term “geometric structure” is defined as “a protrusion or cavity having a plurality of faces.” Spec. 27:17. The term “structured” is defined as “when used in connection with a surface means a surface that has a plurality of distinct

faces arranged at various orientations.” Spec. 28:19-20. The term “transition line” is defined as “a line or elongated feature that separates constituent faces of a compound face.” Spec. 28:25-26.

In each of claims 16, 20, and 40, the compound substrate comprises at least a structured surface provided by a “machined substrate” layer having any manner of structured surface by definition and claim language, and a structured surface provided by a “replicated substrate” layer having any manner of structured surface by claim language. The claim language and definitions limit the “structured surface” of the respective substrates to the extent that a face of a cube corner element and a face of a compound face is provided by each of a “machined substrate” layer and a “replicated substrate” layer, each face being a substantially smooth, that is, planar, surface to any extent. The “machined substrate” layer must be discontinuous by claim language in claim 16 and can be discontinuous in claims 20 and 40 by definition. We find no claim limitation or definition in the Specification limiting the material of any specified “substrate” layer, and thus, the substrate material must be capable of providing such “structured surface” layers when “machined” and/or “replicated.” We consider the terms “replicated portion” and “machined portion” in claim 40 in the same manner as the terms “replicated substrate” and “machined substrate” in claims 16 and 20.

The claim terms “machined” and “replicated” indicate mechanical processing, as Appellants point out, but the claims do not contain any process step limitation(s) on such processes, as the Examiner points out. We determine that the term “machined” does not connote a particular result as does “welding” wherein two pieces of metal are joined by heating, forming a

weld joint. As Appellants point out, the term “machined” is used in the Specification in the structure forming sense of “to cut” material from a substrate, which is part of its ordinary dictionary meaning of “[t]o cut, shape, or finish by machine.”<sup>2</sup>

We find the term “replicated” is used in the Specification in the structure modifying sense of making one structured surface by duplicating another structured surface. Thus, this term has the ordinary dictionary meaning of “to duplicate, copy, reproduce, or repeat.”<sup>3</sup> We notice that it is well known that a structure of one substrate surface can be replicated in a second substrate by, e.g., machining methods, such as cutting, as well as other duplicating methods, such as molding. Indeed, molding is a form of “shaping” a substrate as is cutting, and molding methods can be performed by a variety of machines including a mold, a press, and an embossing roller. In this respect, the thus “replicated” surface results from a “machined” substrate. Furthermore, as the Examiner points out, there is no requirement in any claim language or definition that the structured surface layers as “machined” and as “replicated” must be structurally different in any respect. Indeed, we find no basis in the claim language or in the Specification which supports Appellants’ contentions that the “machined” and “replicated” substrate layers can be distinguished on the basis of the crystallinity of the resulting substrate.

We further do not find in the claim language or definitions in the Specification any requirement that the formation of the structured surface of

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<sup>2</sup> See, e.g., **machined**, *The American Heritage Dictionary of The English Language* 1047 (4th ed., Boston, Houghton Mifflin Company, 2000).

<sup>3</sup> See, e.g., **replicated**, *The American Heritage Dictionary of The English Language* 1480 (4<sup>th</sup> ed., Boston, Houghton Mifflin Company, 2000).

the “machined substrate” layer and that of the “replicated substrate” layer must be connected to any extent. Indeed, we find no basis in the claim language or in the disclosure in the Specification to read the illustrative embodiments in the Specification into the claims as limitations. *See, e.g., Zletz*, 893 F.2d at 321-22.

The claim term “transition line” in claim 40 is, by definition, a line or elongated feature that separates at least two distinguishable constituent faces of a compound face on the compound substrate, wherein one face or “face portion” is on a “machined portion” layer and a second face or “face portion” is on a “replicated portion” layer and thus, on opposite sides of the “transition line.” There is no definition of the “elongated feature” in the Specification or specified in the claim, and thus the same can be a gap or groove between the two otherwise approximate and substantially aligned faces of the compound face. Indeed, claim 40 requires that the constituent faces of the compound face are located on different layers which must necessarily have a line or elongated feature therebetween.

Accordingly, on this record, we determine, as a matter of law, that claims 16, 20, and 40 encompass a product characterized by the process by which it is made because of the claim terms “machined substrate” and “replicated substrate.” *See, e.g., In re Thorpe*, 777 F.2d 695, 696-97 (Fed. Cir. 1985), and cases cited therein. Therefore, applying the broadest reasonable construction to the terms of the claims in light of the Specification, the claimed compound substrates encompassed by claims 16, 20, and 40 include compound substrates with at least two layers which can be prepared by machining in any manner a substrate to obtain a “machined substrate” or “machined portion” layer having a specified “structured

surface” and by replicating in any manner a structured surface onto a substrate to obtain a specified “replicated substrate” or “replicated portion” layer, wherein the “structured surface” and the materials of the respective substrate or portion layers can be the same or different.

We find Bacon would have described to one skilled in this art, with reference to Fig. 1, conformable cube corner retroreflective sheeting 10 having a plurality of discrete cube corner segments 12 conformably bonded together, wherein each cube corner segment 12 comprises a plastic body portion 14 having side walls at 50 with at least one cube corner retroreflective element 20 defining cube corner point side 22. Bacon, e.g., col. 2, l. 59 to col. 3, l. 41, col. 6, l. 44 to col. 7, l. 55, and Fig. 1. The cube corner segments 12 are defined by a pattern of separations at 50 such as a plurality of contiguous polygons selected from, among other things, triangles and hexagons, and “[e]ach cube corner retroreflective element 20 comprises a plurality of (e.g., three) . . . faces . . . defined in part by a plurality of microreplicated grooves 32.” Bacon, e.g., col. 3, ll. 42-45, col. 6, l. 64 to col. 7, l. 4, and Fig. 1. The conformable cube corner retroreflective sheeting 10 can be made using a tool providing a molding surface and pressing heated thermoplastic sheeting onto the molding surface to form a plurality of cube corner segments 12 and dividing the molded sheet into a plurality of segments 12 by forming sidewalls 50. Bacon, e.g., col. 4, ll. 41-65, and col. 13, l. 13 to col. 14, l. 42.

We find Nilsen would have described to one skilled in this art, with reference to Fig. 2, a retroreflective article with multiple size prisms 50 on solid micropattern formation 26, formed by molding, are pattern metallized on side facets, that is, faces, 40 of prisms 50, such as by vacuum

metallization or printing, to form discontinuous metal coatings 30A-B, leaving some prisms 50 uncoated. Nilsen, e.g., col. 1, ll. 42-60, col. 2, ll. 35-50, col. 3, ll. 7-19, col. 3, l. 36 to col. 4, l. 14, col. 4, ll. 35-40, and Fig. 2. “The microprisms 26 are closely spaced and can be described as cube corner formations.” Nilsen col. 2, ll. 60-61.

We find Appellants acknowledge in the Specification that direct machining techniques, in which a “series of grooved side surfaces are formed in the plane of a planar substrate,” have “the ability to accurately machine very small cube corner elements,” wherein “a large number of individual faces are typically formed in a continuous motion of the cutting tool,” are known in the art. Spec. 2:23 to 3:11.

There is no dispute that each of Bacon and of Nilsen in fact describe articles having cube corner elements and compound faces which correspond to the structure elements of the structured surface of a compound substrate article as claimed, in the manner graphically shown by the Examiner in the Answer. *See above* pp. 3-4. Upon comparing the claimed compound substrate article encompassed by claims 16, 20, and 40, as we interpreted these claims above, with the descriptions of compound substrate articles in Bacon and Nilsen relied upon, we agree with the Examiner that *prima facie* as a matter of fact the claimed and reference articles reasonably appear to be identical in all claim elements. *See, e.g., In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997); *In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990). Thus, the burden is shifted to Appellants to patentably distinguish the claimed articles by the submission of affective argument and/or objective

evidence. See, e.g., *In re Best*, 562 F.2d 1252, 1255-56 (CCPA 1977);<sup>4</sup> *In re Skoner*, 517 F.2d 947, 950-51 (CCPA 1975); cf. *Spada*, 911 F.2d at 708-09.<sup>5</sup>

Appellants' contentions that the claimed articles distinguish over the prior art articles by reason of the specified "machined" method by which at least one layer of the claimed article is formed, and thus, of a "transition line" between "machined" and "replicated" layers, are not supported by sufficient argument or evidence. Indeed, Appellants do not establish that the "replicated" layers of Bacon and of Nilsen and the patterned, discontinuous metal layer of Nilsen cannot be prepared by machining, such as by known direct machining techniques, or otherwise have different surface structures and/or other characteristics than exhibited by layers that are "machined."

<sup>4</sup> Where, as here, the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. See *In re Ludtke*, [441 F.2d 660 (CCPA 1971)]. Whether the rejection is based on "inherency" under 35 U.S.C. § 102, on "prima facie obviousness" under 35 U.S.C. § 103, jointly or alternatively, the burden of proof is the same, and its fairness is evidenced by the PTO's inability to manufacture products or to obtain and compare prior art products. [Footnote and citation omitted.]

*Best*, 562 F.2d at 1255.

<sup>5</sup> The Board held that the compositions claimed by Spada "appear to be identical" to those described by Smith. While Spada criticizes the usage of the word "appear," we think that it was reasonable for the PTO to infer that the polymerization by both Smith and Spada of identical monomers, employing the same or similar polymerization techniques, would produce polymers having the identical composition.

*Spada*, 911 F.2d at 708.

*See, e.g., Spada*, 911 F.2d at 708-09; *Thorpe*, 777 F.2d at 696-97; *Best*, 562 F.2d at 1255-56; *Skoner*, 517 F.2d at 950-51. Indeed, with respect to claim 40, in Bacon, each cube corner segment 12 with sidewalls 50 is a separate layer and all such layers form the compound substrate article 10. In this respect, the sidewalls 50 of adjacent segment 12 layers constitute a “transition line” where sidewall 50 is formed along groove 32, separating faces of a cube corner retroreflective element 20 that are in the respective surfaces of the adjacent segment layers 20, as the Examiner contends. Thus, the adjacent segment layers 12 appear to be identical and, on this record, can reasonably be “machined” or “replicated.”

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of anticipation found in Bacon and in Nilsen with Appellants’ countervailing evidence of and argument for non-anticipation and conclude that the claimed invention encompassed by appealed claims 16 through 23 and 40 would have been anticipated as a matter of fact under 35 U.S.C. § 102(b).

The Primary Examiner’s decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2007).

**AFFIRMED**

tf/lis



Appeal 2007-2987  
Application 09/515,978

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